CHAPTER 8

COMBAT SUPPORT

The task force commander is responsible for effective CS. Mortars, artillery, air defense artillery, combat engineers, and aviation assets provide CS for the platoon. The task force commander decides how to employ assets based on his estimate of the situation. He attaches supporting elements to the company team, or he places CS elements under OPCON, in DS, or in GS of the company team. The company team commander may attach supporting elements to the platoon. The platoon leader must know the employment considerations and abilities of all CS assets.

Section I. INDIRECT FIRE SUPPORT

The main indirect-fire support available to the BFV platoon includes mortars and field artillery (Table 8-1). This section discusses the responsibilities, considerations, and procedures for employing all the indirect-fire assets supporting the BFV platoon. (FM 6-30 discusses in detail how to call for and adjust indirect fires.)

WEAPON	AMMUNITION		RANGE (in meters)	
	MODEL	TYPE	MINIMUM	MAXIMUM
60-mm M224	M720/M889	HE	70	3,500
	M722	WP	70	3,500
	M721	ILLUM	200	3.500
	M302A1	WP	35	1,830
	M83A3	ILLUM	725	950
	M49A4	HE	45	1,830
81-mm M29A1	M374A2	HE	70	4,600
	M372A3	HE	73	4,790
	M375A2	WP	73	4,595
	M301A3	ILLUM	100	3,950
81-mm M252	M281/M889	HE	80	5,800
	M374A3	HE	73	4,790
	M819	RP	300	4,800
	M375A2	WP	73	4,595
	M853	ILLUM	300	5,060
	M301A3	ILLUM	100	3,950
120-mm M120	M77	HE	200	7,200
	M68	WP	200	7,200
	M91	ILLUM	200	7,100
	M933	HE (PD)	200	7,200
	M934	HE (MOF)	200	7,200
	M929	WP	200	7,200
	M930	ILLUM	200	7,200

HE High-explosive
WP White phosphorus
ILLUM Illumination
RP Red phosphorus

Table 8-1. Mortar capabilities.

8-1. FIRE PLANNING

The BFV platoon must understand how the task force plans and executes indirect fires in support of the commander's scheme of maneuver. The task force commander attaches or

places a FIST under OPCON to help the platoon call for fires. The task force FSO advises and integrates indirect fire support into the scheme of maneuver.

8-2. FIRE SUPPORT MATRIX

The fire-planning process begins at higher echelons and continues down through the company team FSOs and other key personnel, to include the BFV platoon leader. The effectiveness of this process depends on continuous interaction and feedback from the lower echelons upward. Key functions include refinement and confirmation of target locations and execution of events. Specific responsibilities include those listed on the fire support execution matrix. The matrix shows the leader who bears responsibility for each target, when the responsible party should execute the target, and what means (artillery, mortars, CAS) he or they should use. Figure 8-1 shows an example fire support matrix developed by a task force FSO. It shows maneuver elements along the left side and the different phases of the mission along the top. It shows the platoon's role throughout the operation. The preparer should always include the platoon as a subunit in the matrix.

UNIT	PHASE/TRIGGER LINES				
	PL MACE	PL BOW	PL ARROW	PL BLUE	
5-87					
A-CO			BB 3401	BB 3111 BB 0012 ←MORTAR PRIORITY→	
B-CO	BB 0001 BB 3003 ←FA PRIORITY→	BB 3001 ←MORTAR PRIORITY→			
C-CO			BB 3010		
AT		BB 0007 BB 3002	BB 0013 BB 0009 ←FA PRIORITY→	BB 0015 GP B1B	
RECON PLATOON	BB 0029 BB 3004	BB 0017			
MORTARS	PSN A1, A2	BB 3001 PSN B1	PSN B2, C1	BB 3111 PSN C2	

FA ORGANIZATION FOR COMBAT	MORTAR POSITIONS	AMMUNITION AVAILABLE
4-5 FA (105) DS TO 2 BDE	PSN A1 123455 A2 124456 PSN B1 1274556 B2 128452 PSN C1 131500 C2 130495	30 MIN ARTY SMOKE 20 MIN MORTAR SMOKE 30 MIN ARTY ILLUM 30 MIN MORTAR ILLUM
FS COORD MEASURES		**TACAIR**
CFL: PL BOW O/O CFL: PL ARROW O/O CFL: O/O CFL:		4 TF SORTIES 4 ACAs (#) 20-23 (SEE ACA OVERLAY)
FASCAM	**BDE CDR TGT. GUIDANCE**	**HIGH PAYOFF TARGETS**
TF ALLOCATION: 2 BDE 2 PLANNED: 195450 200444 199455 221456	DEST ADA NEUT RECON ELEMENTS SUPPRESS AR, MECH PLTS	ZSU 32-4, SA 9 MRB's CRP (3 BMPs, 1 BRDM) ENGINEERS

COC IS: - A - , - B - , - C - , FSO WITH - A - FSE BEING O/O BN FSE

SOI
DAY - 1 - FA DS BN CDR: H70__ A FSO: A99__ FA FDC: __H55__
CF 2: 45.20 BDE FSCOORD: E24__ B FSO: B99__ MORTAR FDC: __U55__
FD 1: 55.70 BDE FSO: J99__ C FSO: C99__
MORTAR: 32.60 BN FSO: C99__ OIC - O - NCOIC - N - RATELO - R -

COORDINATING INSTRUCTIONS:

1. TARGET ALLOCATION: A 3, B 3, C 2
2. CUTOFF FOR TARGET SUBMISSION 052200 OCT.
3. SURVEY TARGETS FOR A, B, MORTAR FIRING POSITIONS. FSOs TAKE SURVEY TO NEXT LOCATION.

Figure 8-1. Example of a fire support matrix.

8-3. CALL FOR FIRE

The task force fire support matrix might require the BFV platoon to call for and adjust its own indirect-fire support. The matrix might also designate platoon targets. The platoon uses

these preplanned artillery targets to call for and adjust indirect fire. Either a soldier or an FO can prepare and request a call for fire. However, to receive immediate indirect-fire support, the observer must plan targets and follow proper call-for-fire procedures. If available, he should use a GPS and laser range finders. The call for fire must include certain elements and might include others.

a. **Required Elements.** Calls for fire must include—

(1) ***Observer Identification and Warning Order.*** Observer identification tells the FDC who is calling. It also clears the net for the duration of the call. The warning order tells the FDC the type of mission and the method of locating the target. The types of indirect fire missions are as follows:

- Adjust fire—Use this command when uncertain of target location.
- Fire for effect—Use this command for rounds on target; no adjustment.
- Suppress—Use this command to obtain fire quickly.
- Immediate suppression—Use this command to indicate the platoon is already being engaged by threat; must give target identification.

(2) ***Target Location Methods.*** The observer sends the target location as six digits (letters and numbers). Before the first adjusting rounds are fired, the observer gives the direction in mils. The FDC must know the observer's exact location. The observer sends observer-target (OT) direction (to the nearest 10 mils) from his position to the target. He specifies which target location method to use:

- Grid (Figure 8-2).
- Polar (Figure 8-3, page 8-4).
- Shift from a known point (Figure 8-4, page 8-4).
- Range shifts and lateral shifts (Figure 8-5, page 8-5).

INITIAL FIRE REQUEST	
Observer	**FDC**
Z57, THIS IS 271, ADJUST FIRE, OVER.	THIS IS Z57, ADJUST FIRE, OUT.
GRID NK180513, OVER.	GRID NK180513, OUT.
INFANTRY PLATOON IN THE OPEN, ICM IN EFFECT, OVER.	INFANTRY PLATOON IN THE OPEN, ICM IN EFFECT, OVER.
MESSAGE TO OBSERVER	
Observer	**FDC**
Z, 2 ROUNDS, TARGET, AF1027, OVER.	Z, 2 ROUNDS, TARGET IS AF1027, OUT.
DIRECTION 1680, OVER.	DIRECTION 1680, OUT.
NOTE: Send direction before or with the first subsequent correction.	

Figure 8-2. Example fire mission (grid).

INITIAL FIRE REQUEST	
Observer	**FDC**
Z56, THIS IS Z31, FIRE FOR EFFECT, POLAR. OVER.	THIS IS Z56, FIRE FOR EFFECT, POLAR, OUT.
DIRECTION 4520, DISTANCE 2300, DOWN 35. OVER.	DIRECTION 4520, DISTANCE 2300, DOWN 35, OUT.
INFANTRY COMPANY IN OPEN, ICM, OVER.	INFANTRY COMPANY IN OPEN, ICM, OVER.
MESSAGE TO OBSERVER	
Observer	FDC
Y, VT, 3 ROUNDS, TARGET, AF2036, OVER.	Y, VT, 3 ROUNDS, TARGET AF2036, OUT.

Figure 8-3. Example fire mission (polar plot).

INITIAL FIRE REQUEST	
Observer	**FDC**
H66 THIS IS H44, ADJUST FIRE, SHIFT AA7733, OVER.	THIS IS H66, ADJUST FIRE, SHIFT AA7733, OUT.
DIRECTION 5210, LEFT 380, ADD 400, DOWN 35, OVER.	DIRECTION 5210, LEFT 380, ADD 400, DOWN 35, OUT
COMBAT OP IN OPEN, ICM IN EFFECT, OVER.	COMBAT OP IN OPEN, ICM IN EFFECT, OUT.
MESSAGE TO OBSERVER	
Observer	FDC
H, 1 ROUND, TARGET AA7742, OVER.	H, 1 ROUND, TARGET, AA7742, OUT.
NOTE: Shift from a known point is performed when the observer and FDC have a common known point. The observer sends OT line, then determines the lateral and range shifts.	

Figure 8-4. Example fire mission (shift from a known point).

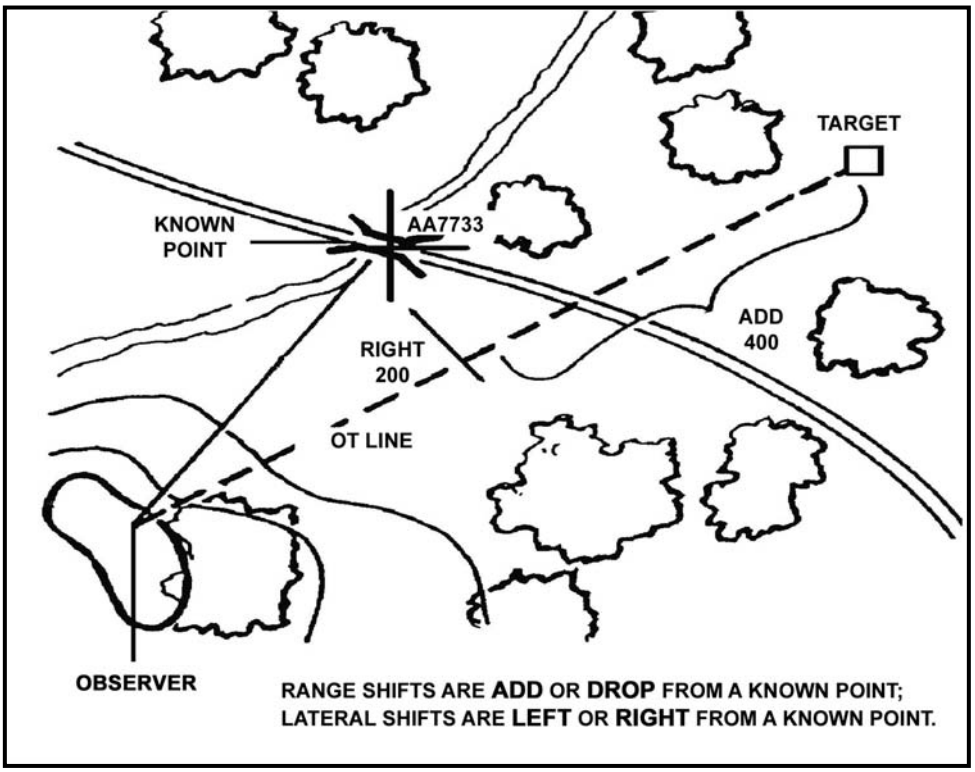


Figure 8-5. Lateral and range shifts.

(3) ***Target Description.*** Give a brief description of the target using the acronym "SNAP":

- Size/shape.
- Nature/nomenclature.
- Activity.
- Protection/posture.

b. **Optional Elements.** A call for fire might also include the following information:

(1) ***Method of Engagement.*** The method of engagement consists of danger-close (if applicable), distribution, ammunition, and trajectory.

(2) ***Method of Fire and Control.***

- At My Command—fired at observer's command; when ready—standard method of fire control.
- Cannot Observe—fire will not be observed.
- Time on Target—rounds land at specified time.
- Continuous Illumination—FDC determines when to fire.
- Coordinated Illumination—observer determines when to fire.
- Cease Loading—used when two or more rounds are in effect (causes loader to stop loading).
- Check Firing—temporary halt in firing.
- Continuous Fire—will continue to fire unless told to stop.
- Repeat—will repeat last mission.

(3) ***Refinement and End of Mission.***

- Correct any adjustments.
- Record as target.
- Report battle damage assessment.

(4) ***Danger-Close***. Danger-close information is included when applicable.

- FA and mortars—Danger-close target is within 600 meters of friendly troops.
- Naval gunfire—Danger-close target is within 750 meters when using 5-inch or smaller guns (1,000 meters for larger naval guns).
- Method of adjustment—During danger-close missions, the FO uses only the creeping method of adjustment (corrections of no more than 100 meters).

8-4. ADJUST FIRE

Once he calls for fire, the observer adjusts the fire onto the target. If he has accurately located the target, he requests fire for effect. If the observer cannot locate the target (because of deceptive terrain, lack of identifiable terrain features, poor visibility, or an inaccurate map), he adjusts the impact point of the rounds. One artillery piece or mortar adjusts fire. The observer chooses an adjusting point: for a destruction mission (precision fire), the target is the adjusting point; for an area target (area fire), the observer picks a well-defined adjusting point close to the center. The observer spots the first and each successive adjusting round, and he sends range and deviation corrections back to the FDC until rounds hit the target. The observer spots by relating the round's point of impact to the adjusting point. (See FM 6-30 for a more detailed discussion of adjusting mortar and artillery fire.)

a. **Deviation Spotting.** Deviation (left or right) spotting involves measuring the horizontal angle (in mils) between the burst and the adjusting point (Figure 8-6). A burst to the right (left) of the target is spotted as "(so many) mils right (left)." The observer uses an angle-measuring device to determine deviation. He might use the mil scale on his binoculars (Figure 8-7) or his fingers and hand (Figure 8-8).

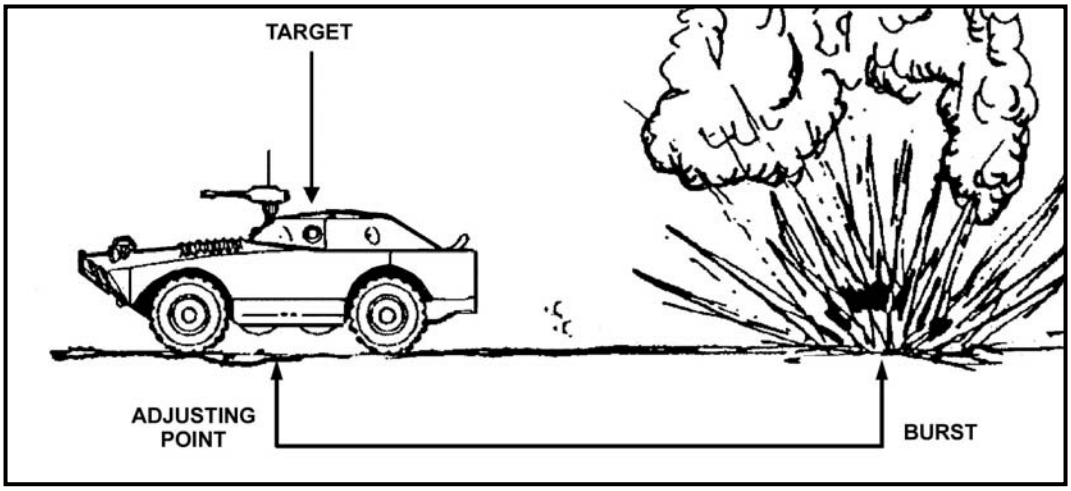


Figure 8-6. Deviation spotting.

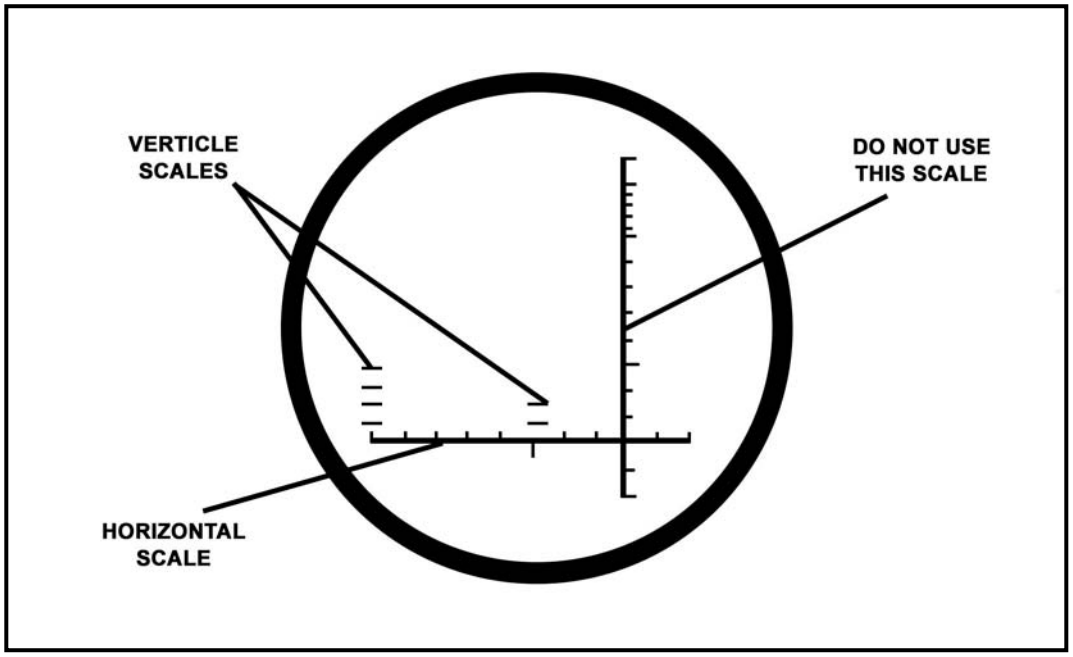


Figure 8-7. Mil scale on M17 binoculars.

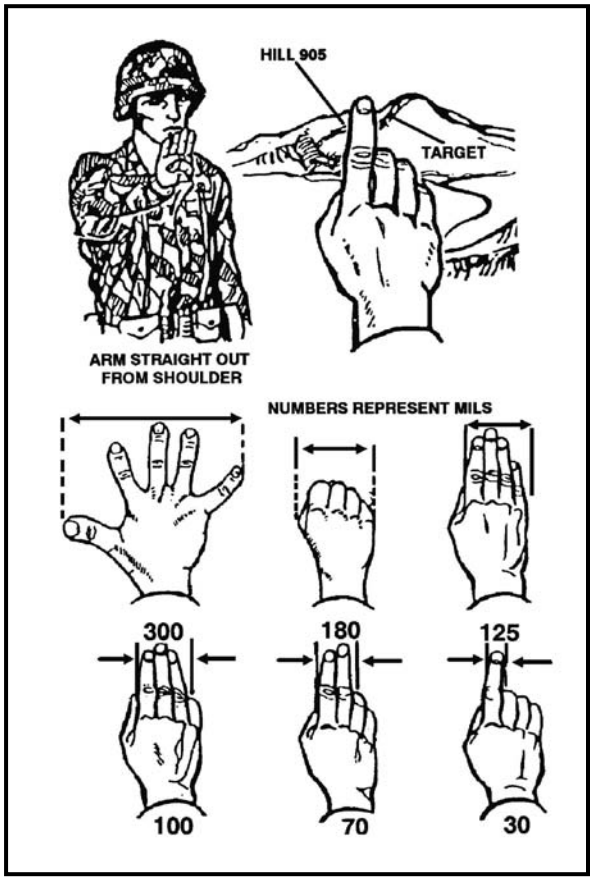


Figure 8-8. Hand and fingers used to determine deviation.

(1) On binoculars, the horizontal scale is divided into 10-mil increments and is used for measuring horizontal angles. The vertical scales in the center and on the left of the reticle are divided into 5-mil increments and are used for measuring vertical angles. The scale on the right, if present, is no longer used.

(2) A burst on the OT line is spotted as "line." Deviation (left or right) should be measured to the nearest 5 mils for area targets, with measurements taken from the center of the burst. Deviation for a destruction mission (precision fire) is estimated to the nearest mil. (Figure 8-9 shows the adjusting point at the center of the binocular horizontal scale.)

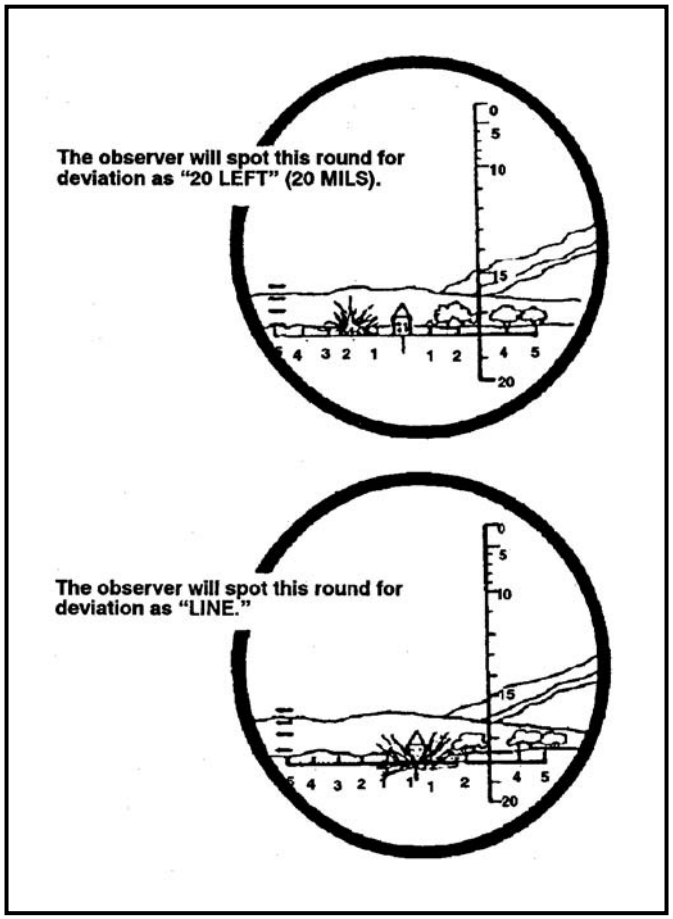


Figure 8-9. Deviation spotting with binoculars.

b. **Deviation Correction.** Deviation correction is the distance (in meters) the burst must be moved left or right to be on line between the observer and the target. Once the mil deviation has been determined, the observer converts it into a deviation correction (in meters). He sends it to the FDC either when sending the range correction for the next adjusting round or when calling for fire for effect. The deviation correction is determined by multiplying the observed deviation in mils by the distance from the observer to the target in thousands of meters (the OT factor). The result is expressed to the nearest 10 meters (see Example 1). A minor deviation correction (10 to 20 meters) should be made in adjustment of precision fire. In adjustment of area fire, small deviation corrections (20 meters or less) can be ignored except when a small change determines a definite range spotting. Throughout

the adjustment, the observer moves the adjusting rounds close enough to the OT line so that range spotting is accurate. If the OT distance is greater than 1,000 meters, round to the nearest thousand and express it in thousands of meters (Example 2). If the OT distance is less than 1,000 meters, round to nearest 100 meters and express it as a decimal in thousands of meters (Example 3).

EXAMPLE 1:
Observer deviation 20 mils
OT distance, 2,000 meters
OT factor 2
Observer deviation x OT factor = deviation correction.
20 x 2 = 40 meters

EXAMPLE 2:
OT distance, 4,200 meters—OT factor, 4.0
OT distance, 2,700 meters—OT factor, 3.0

EXAMPLE 3:
OT distance, 800 meters—OT factor, 0.8

c. **Angle T.** Angle T (Figure 8-10) is the angle formed by the intersection of the gun-target line and the OT line with its vertex at the target. If angle T is 500 mils or greater, the FDC should tell the observer. If this occurs, the observer first continues to use the OT factor to make his deviation corrections. If he sees that he is getting more of a correction than he has asked for, the observer should consider cutting the corrections to better adjust rounds onto the target.

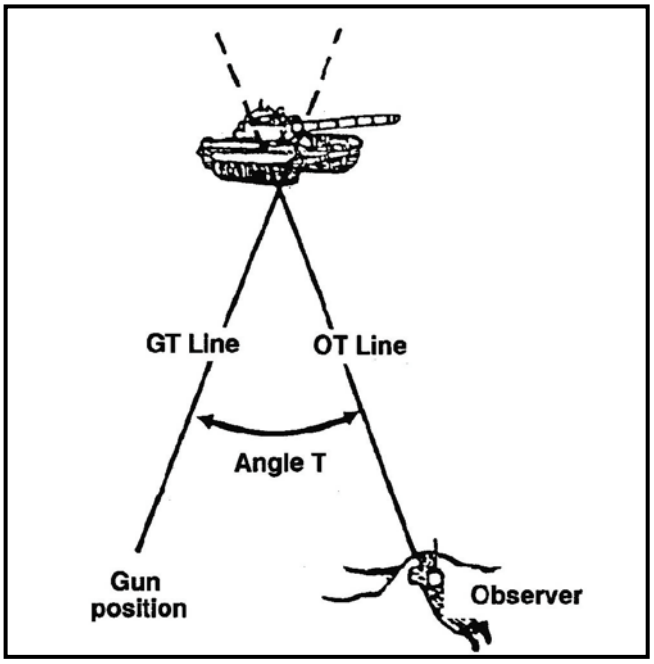


Figure 8-10. Angle T.

d. **Range Spotting.** Range spotting (short or over) requires adjusting the range to obtain fire on the target. An adjusting round's burst on or near the OT line gives a definite range

spotting. If he cannot make a definite spotting, the observer announces a "lost" or "doubtful" spotting. In these situations only, he gives the deviation correction to the FDC.

(1) ***"Over."*** The observer sees the burst beyond the adjusting point.

(2) ***"Short."*** The observer sees the burst between himself and the adjusting point.

(3) ***"Target."*** The observer sees the burst hit the target. He uses this spotting only in precision fire (destruction missions).

(4) ***"Range Correct."*** The observer believes that the burst occurred at the correct range.

(5) ***"Doubtful."*** The observer sees the burst but cannot tell whether it occurred over, short, target, or range correct.

(6) ***"Lost, Over" or "Lost, Short."*** The observer cannot see the burst, but he knows that it occurred beyond or short of the adjusting point.

e. **Range Correction.** With each successive correction, the *adjusting round* lands over or short of the *adjusting point*, but closes on the target.

(1) ***Bracketing.*** Bracketing brings fire on a target. Time is important, especially while targets move or seek cover from fire. Accuracy of data and speed of adjustments determine the effectiveness of the fire. To reduce adjustment time, the observer tries to bracket the target with the first two or three adjusting rounds.

(2) ***Successive Bracketing.*** The observer calls FFE when a range correction brings the round within 50 meters of the adjusting point. He also calls FFE when the firer splits a 100-meter bracket; for example, "Drop 50, fire for effect." This technique is called successive bracketing (Figure 8-11). When bracketing, the observer uses the following guide to determine his first range correction.

- OT between 1,000 to 2,000 meters—add or drop at least 200 meters.
- OT greater than 2,000 meters—add or drop at least 400 meters.

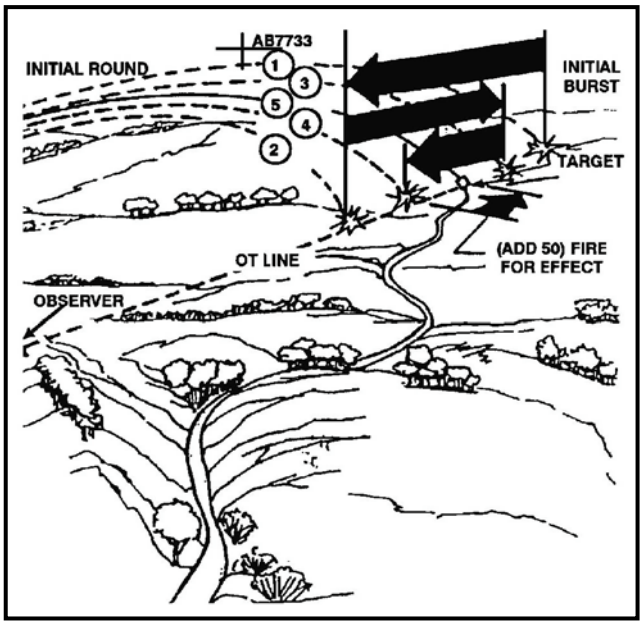


Figure 8-11. Successive bracketing technique.

(3) ***Hasty Bracketing.*** The effect on the target decreases as the number of rounds used in adjustment increases. Successive bracketing ensures that FFE rounds hit within 50 meters of the adjusting point. Hasty bracketing offers a quicker alternative to successive bracketing. A successful hasty bracket depends on a thorough terrain analysis, which gives the observer an accurate initial target location. For his first correction, the observer receives a bracket similar to that used for successive bracketing. Once the observer receives the initial bracket, he uses it like a yardstick to determine the subsequent correction. He then sends the FDC the correction to move the rounds to the target and to fire for effect (Figure 8-12). Hasty bracketing improves with observer experience and judgment.

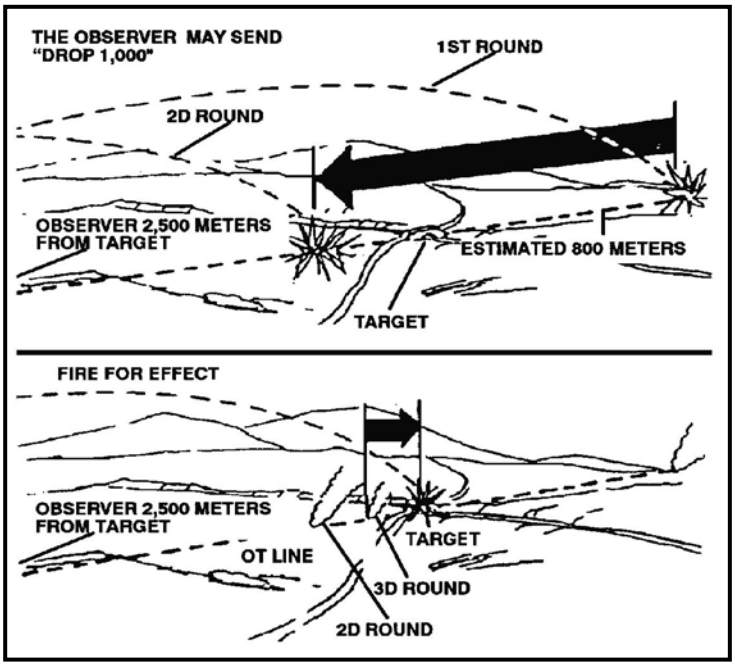


Figure 8-12. Hasty bracketing technique.

(4) ***Creeping Method.*** In danger-close situations, the observer uses the creeping method of adjustment. The observer calls for the first round, deliberately overshooting the target. He adjusts rounds in 100-meter increments or less until the fire hits the target (Figure 8-13, page 8-12). This method requires more time and ammunition than other methods; therefore, the observer uses it only when he must consider safety first.

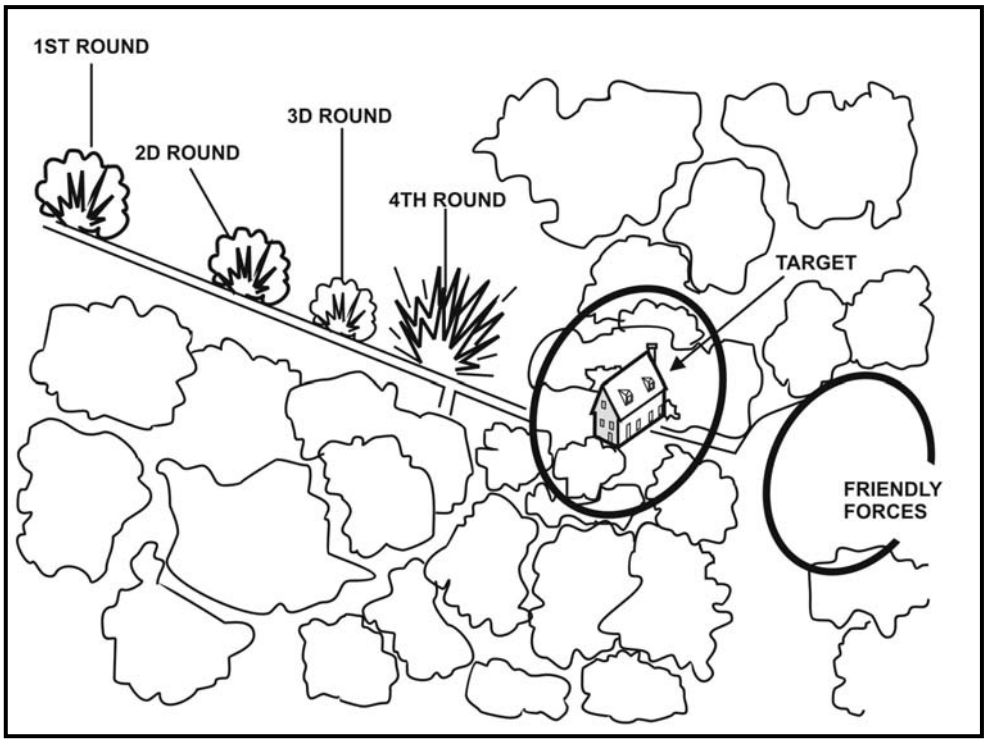


Figure 8-13. Creeping method of adjustment.

8-5. MORTAR SUPPORT

The task force mortar platoon has four mortars, which fire 120-mm rounds. The mortar platoon provides immediate indirect-fire support. Using mortars, the platoon can quickly place a heavy volume of accurate, sustained fire on the threat. Mortar rounds can strike targets that low-angle fires cannot reach. These include targets on reverse slopes, in narrow ravines or trenches, and in forests or towns, among others. The maximum effective range for the 120-mm mortar is 7,200 meters

a. **Types of Mortar Support.** Mortars provide the following types of effective support.

(1) ***Suppression.*** The platoon can fire HE rounds to force the threat to button up or move to less advantageous positions. Only a direct hit, however, will destroy an armored vehicle.

(2) ***Smoke.*** The platoon uses WP rounds for obscuration and screening. Mortar smoke builds up more rapidly than artillery smoke. To obscure the threat's vision, the platoon places smoke on or just in front of his positions. Placing smoke between the threat and the platoon's position conceals platoon movement. Mortar smoke marks threat positions to aid in friendly maneuver and orient direct fires. Scouts must be careful, however, not to allow smoke to work against them by marking their own positions for threat gunners.

(3) ***Illumination.*** The platoon uses illumination rounds to light an area or threat position during periods of limited visibility. Illumination increases the effectiveness of image-intensification devices, which helps with gathering information, adjusting artillery, and engaging threat targets. The platoon also uses ground-burst illumination to mark threat positions and to provide a thermal TRP for control of fires. The platoon must use illumination carefully so as not to illuminate friendly positions. Because U.S. night vision devices work better than those of most potential adversaries, the platoon may not need to

illuminate the battlefield at all. Doing so could cause more harm than good by revealing friendly positions.

b. **Capabilities and Limitations.** The advantages of using the mortar platoon include its close working relationship with BFV platoons, fast response time, and availability for low-density targets. The limitations of the platoon are—

- Short-range capability only.
- Few types of ammunition available.
- Mortar elements can carry only limited amounts of ammunition.
- FDC and mortar tubes unlinkable to advanced field artillery tactical data system (AFATDS).

8-6. FIELD ARTILLERY SUPPORT

The BFV platoon must know how to use artillery support to its best advantage. Artillery often offers the best way to impede and disrupt threat formations and suppress threat positions. It can provide immediate, responsive, and accurate fires with a wide variety of munitions. An artillery task force in direct support of a committed maneuver brigade provides field artillery support. The reconnaissance platoon might receive FA priority of fire.

a. **Capabilities.** In support of the platoon, FA elements can—

- Provide fires in all weather conditions and types of terrain.
- Shift and mass fires rapidly.
- Support the battle in depth with long-range fires.
- Provide a variety of conventional shell and fuze combinations.
- Provide continuous fires by careful positioning and timely displacement.

b. **Limitations.** FA support has the following limitations:

- Limited capability against moving targets.
- Might require large amounts of ammunition to destroy point targets.
- Firing signature makes it vulnerable to detection.

c. **Munitions.** FA employs a wide variety of munitions that the platoon can tailor to engage different types of targets.

(1) ***High-Explosive.*** The best targets for HE rounds include personnel, field fortifications, and vehicles.

(2) ***Smoke.*** The best uses for smoke include obscuring and screening friendly soldiers.

(3) ***Illumination***. Ideally, these illuminate only the threat, not friendly forces.

(4) ***White Phosphorus.*** This volatile material effectively obscures friendly soldiers or actions, marks locations, and burns obstacles and equipment.

(5) ***Cannon-Launched Guided Projectiles.*** These projectiles (Copperheads) work best against point targets.

(6) ***Improved Conventional Munitions.*** Improved conventional munitions (ICM) work best against personnel targets.

(7) ***Dual-Purpose Improved Conventional Munitions.*** These munitions (DPICM) work best against personnel and light armored vehicles in the open.

(8) ***Scatterable Mines.*** These include *area denial munitions* for use against personnel and *remote antiarmor mines* for use against armored vehicles. An FA battery cannot mix other fire missions with scatterable mine missions. Scatterable mines require slightly more lead time than other FA-delivered munitions.

NOTE: The commander or leader must consider the danger to friendly troops in areas where friendly forces fire AP munitions. The potential dud rate of ICM makes maneuver in the area of an ICM field hazardous.

8-7. FIRE DIRECTION ASSETS

The FIST is attached to company teams for combat operations. The task force might push it forward with the BFV platoon to support security operations when special munitions engagements require on-target designation. The FIST's command-and-control link with the artillery makes it a valuable resource. The FIST should be exposed to fire only when no alternative exists.

a. The FIST is organized, equipped, and trained to provide a fire support advisor and coordinator. It also provides a communications link to all available fire support assets.

b. The company team FIST normally monitors the following radio nets:

- Attached unit command net (task force, company team, or BFV platoon).
- Task force mortar fire direction net.
- DS battalion fire direction net (digital).
- Battalion fire support net (voice).

8-8. FIRE REQUEST CHANNELS

The FSE serves as the NCS on the task force fire support net. The FIST relays the call for fire to supporting artillery on a digital net (AFATDS) or sends the fire mission to the mortar platoon or section. The command net allows the FIST to monitor unit operations. It links the FIST to the commander and platoon leaders for planning and coordination.

a. **Mortar Requests.** The platoon can send requests for mortar fire directly to the mortars on the battalion heavy mortar net. The FSE monitors these requests (Figure 8-14).

b. **Artillery Requests.** The platoon can send requests for artillery fire directly to the FA battalion on a fire direction net; the FSE monitors the requests (Figure 8-15).

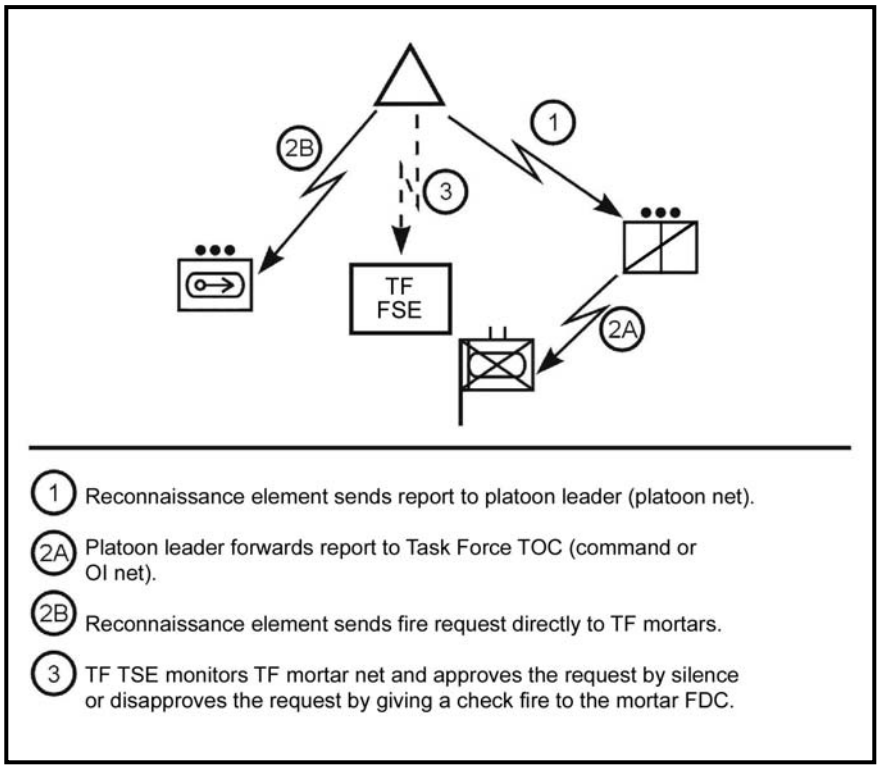


Figure 8-14. Platoon requesting fire from task force mortars.

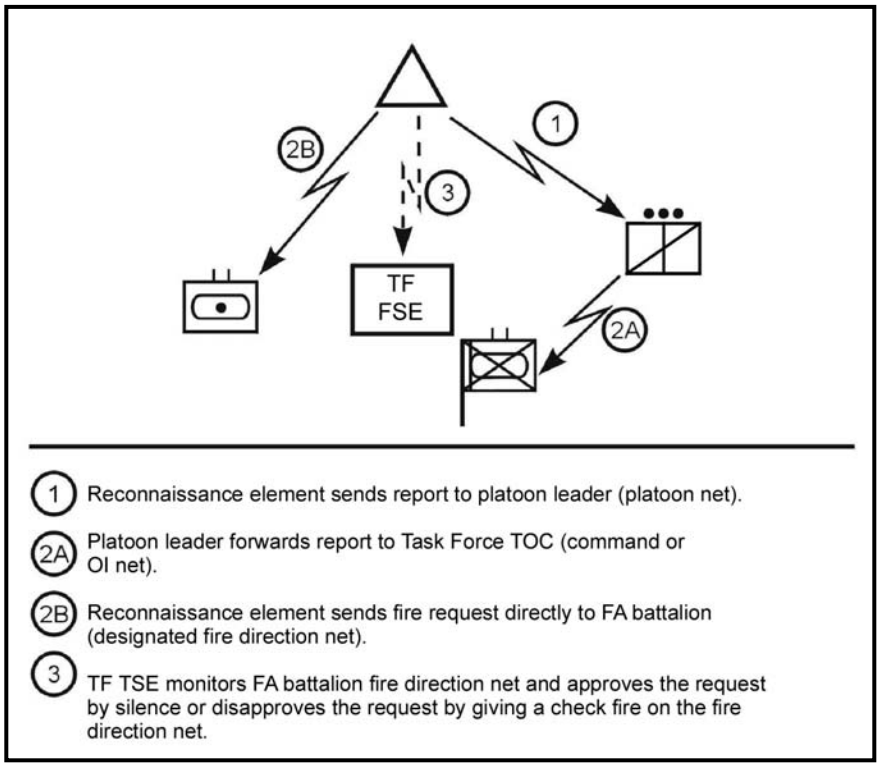


Figure 8-15. Platoon requesting fire from FA battalion.

8-9. CLOSE AIR SUPPORT

All services can provide CAS to the task force. CAS missions are flown against hostile targets near friendly forces. The forward air controller (FAC) is the task force commander's expert in planning, requesting, and executing CAS missions. The FAC serves as a link between the maneuver element and the attacking aircraft. The platoon may provide information the FAC or TACP uses to target enemy forces. Soldiers may provide emergency control if an FAC, FSO, or FO is not available (the task force commander accepts responsibility for friendly casualties). This is possible only with aircraft equipped with FM radios. Most U.S. Air Force, Navy, and Marine Corps fixed-wing aircraft only have UHF radios (A/OA-10, F16, AV-8B, F-14, F/A-18, and AC-130). (For additional information, see FM 6-30.) The platoon may also provide information on battle damage as observed. Figure 8-16 shows the format for assessing and reporting battle damage.

- Battle damage assessment.
- Successful or unsuccessful.
- Target coordinates.
- Time on target.
- Number and type destroyed.
- Number and type damaged.
- Killed by air.
- Wounded by air.
- Dud bombs.

Figure 8-16. Format for battle damage assessment.

a. **AC-130 Gunship.** If the threat air defense is low, the battalion requests CAS from an AC-130 gunship. The AC-130 provides effective fires during day and night operations and flies CAS and special operations. The aircraft contains one 40-mm gun, two 20-mm guns, two 7.62-mm miniguns, and one 105-mm howitzer. It is equipped with sensors and target acquisition systems that include forward-looking infrared radar and low-light television.

b. **Marking Friendly Positions.** Whenever possible, friendly positions are marked to enhance safety and to provide target area references. Methods of marking friendly positions are shown in Table 8-2.

METHOD	DAY/ NIGHT	ASSETS	FRIENDLY MARKS	TARGET MARKS	REMARKS
SMOKE	D/N	ALL	GOOD	GOOD	Easily identifiable, may compromise friendly position, obscure target, or warn of fire support employment. Placement may be difficult due to structures.
SMOKE (IR)	D/N	ALL/ NVD AT NIGHT	GOOD	GOOD	Easily identifiable, may compromise friendly position, obscure target, or warn of fire support employment. Placement may be difficult due to structures. Night marking is greatly enhanced by the use of IR reflective smoke
ILLUM, GROUND BURST	D/N	ALL	N/A	GOOD	Easily identified, may wash out NVDs.
SIGNAL MIRROR	D	ALL	GOOD	N/A	Avoids compromise of friendly location. Dependent on weather and available light and may be lost in reflections from other reflective surfaces (windshields, windows, water, etc.)
SPOT LIGHT	N	ALL	GOOD	MARGINAL	Highly visible to all. Compromises friendly position and warns of fire support employment. Effectiveness is dependent upon degree of urban lighting.
IR SPOT LIGHT	N	ALL NVD	GOOD	MARGINAL	Visible to all with NVGs. Less likely to compromise than overt light. Effectiveness dependent upon degree of urban lighting.
IR LASER POINTER (below .4 watts)	N	ALL NVG	GOOD	MARGINAL	Effectiveness dependent upon degree of urban lighting.
IR LASER POINTER (above .4 watts)	N	ALL NVD	GOOD	GOOD	Less affected by ambient light and weather conditions. Highly effective under all but the most highly lit or worst weather conditions. IZLID-2 is the current example.
VISUAL LASER	N	ALL	GOOD	MARGINAL	Highly visible to all. Risk of compromise is high Effectiveness dependant upon degree of urban lighting.
LASER DESIG-NATOR	D/N	PGM OR LST EQUIPED	N/A	GOOD	Highly effective with PGM. Very restrictive laser acquisition cone and requires line of sight to target. May require pre-coordination of laser codes
TRACERS	D/N	ALL	N/A	MARGINAL	May compromise position. May be difficult to distinguish mark from other gunfire. During daytime use, may be more effective to kick up dust surrounding target.
ELEC-TRONIC BEACON	D/N	SEE REMARKS	EXCELLENT	GOOD	Ideal friendly marking device for AC-130 and some USAF fixed wing (not compatible with Navy or Marine aircraft). Least impeded by urban terrain. Can be used as a TRP for target identification. Coordination with aircrews essential to ensure equipment and training compatibility.
STROBE (OVERT)	N	ALL	MARGINAL	N/A	Visible by all. Effectiveness dependent upon degree of urban lighting.
STROBE (IR)	N	ALL NVD	GOOD	N/A	Visible to all NVDs. Effectiveness dependent upon degree of urban lighting. Coded strobes aid in acquisition

Table 8-2. Methods of marking friendly positions.

METHOD	DAY/ NIGHT	ASSETS	FRIENDLY MARKS	TARGET MARKS	REMARKS
FLARE (OVERT)	D/N	ALL	GOOD	N/A	Visible by all. Easily identified by aircrew.
FLARE (IR)	N	ALL NVD	GOOD	N/A	Visible to all NVDs. Easily identified by aircrew.
GLINT/IR PANEL	N	ALL NVD	GOOD	N/A	Not readily detectable by enemy. Very effective except in highly lit areas.
COMBAT IDENTIFI-CATION PANEL	D/N	ALL FLIR	GOOD	N/A	Provides temperature contrast on vehicles or building. May be obscured by urban terrain.
VS-17 PANEL	D	ALL	MARGINAL	N/A	Only visible during daylight. Easily obscured by structures.
CHEMICAL HEAT SOURCES	D/N	ALL FLIR	POOR	N/A	Easily masked by urban structures and lost in thermal clutter. Difficult to acquire, can be effective when used to contrast cold background or when a/c knows general location.
SPINNING CHEM-LIGHT (OVERT)	N	ALL	MARGINAL	N/A	Provides unique signature. May be obscured by structures. Provides a distinct signature easily recognized. Effectiveness dependent upon degree of urban lighting.
SPINNING CHEM-LIGHT (IR)	N	ALL NVD	MARGINAL	N/A	Provides unique signature. May be obscured by structures. Effectiveness dependent upon degree of urban lighting.

Table 8-2. Methods of marking friendly positions (continued).

8-10. ATTACK HELICOPTERS

The primary mission of attack helicopter units is to destroy armor and mechanized forces. Employing attack helicopters in combined arms operations increases the lethality of ground maneuver forces.

a. **Aircraft Characteristics.** The AH-64A Apache, the AH-64D Longbow Apache, the OH-58D Kiowa Warrior, and the AH-1W or AH-1Z (USMC) are employed in attack operations. Table 8-3 provides a comparison of the weapon systems and armaments on these attack helicopters. (The table also lists weaponry for the AH-1 Cobra, which is no longer in the active Army inventory but might be used to provide attack support in joint operations with U.S. Marine units.)

AIRCRAFT TYPE	WEAPON SYSTEMS						
	Hellfire/TOW [1]		Air-to-Air Stinger	2.75-inch (70-mm) Rockets	Cal .50 MG (rds)	20-mm Cannon (rds)	30-mm Chain Gun (rds)
AH-1 [2]		8		76		750	
AH-64A [3]	16			76			1,200
AH-64D [3]	[4] 16		4	76			1,200
OH-58D [2,3]	4		4	14	500		
AH-1W/Z [5]							
Weapons Range (Max)	8 km	3,750 m	5+ km	8 km	2 km	2 km	4 km

Numbers in each column indicate the maximum load for each system.
1 The AH-1 uses the TOW missile as its armor engagement weapon instead of the Hellfire missile.
2 This aircraft carries one weapon system on each side (Hellfire, TOW, or both; air-to-air Stinger; and 2.75-inch rocket).
3 Aircraft has a laser for target designation and an ATHS.
4 Hellfire/Hellfire II.
5 USMC helicopters will have varied weapon loads. During coordination, request on-board weapon status.

Table 8-3. Helicopter weapon systems.

b. **Close Combat Attack.** The close combat attack does not replace the integrated MDMP between ground maneuver and aviation. It is a technique for directing lethal fires within the context of a preplanned mission.

(1) To request immediate close combat attack, the ground unit in contact executes a face-to-face coordination or uses a radio transmission to provide a situation update to the attack aircraft (METT-TC permitting). This situation update contains essential elements from the aviation close combat attack coordination checklist (Figure 8-17, page 8-20).

(2) After receipt of a request for immediate close combat attack, the attack team leader then informs the ground unit leader of the battle position, attack-by-fire position, or the series of positions his team will occupy that will provide the best observation and fields of fire into the engagement or target area. The attack team leader then provides the ground maneuver unit leader with his concept for the team's attack on the objective.

(3) Upon mission completion, the attack team leader provides the ground maneuver commander a battle damage assessment (BDA) of the intended target.

CLOSE COMBAT ATTACK CHECKLIST

1. Threat situation—specific target identification.
2. Friendly situation—location and method of marking friendly positions.
3. Ground maneuver mission/scheme of maneuver.
4. Attack aircraft scheme of maneuver.
5. Planned engagement area and BP/SBF position.
6. Method of target marking.
7. Fire coordination and fire restrictions.
8. Map graphics update.
9. Request for immediate aviation close fight support—used for targets of opportunity or for ground-to-air target handoff.

Figure 8-17. Close combat attack coordination checklist.

Section II. COMBAT ENGINEER SUPPORT

Engineer missions fit into one of three categories: mobility, countermobility, and survivability. (Table 8-4 shows the tasks included in each of these categories.) An engineer platoon might be attached to a company team. Engineers conduct reconnaissance, evaluate obstacles, and use demolitions and field expedients.

MOBILITY	COUNTERMOBILITY	SURVIVABILITY
Breaching obstacles. Clearing minefields. Clearing routes. Expedient gap crossing. Constructing combat roads or trails.	Constructing obstacles to turn, fix, block, or disrupt threat forces.	Constructing crew-served weapons and vehicle fighting positions.

Table 8-4. Engineer missions.

8-11. ENGINEER ORGANIZATION

Typically an engineer company is attached to support a task force. The company consists of two engineer platoons and an assault and obstacle (A&O) platoon. The task force and company team commanders will task organize engineer assets to best accomplish their assigned mission.

a. **Engineer Platoon**. Each engineer platoon is organized into three engineer squads and a headquarters section. It is equipped with four M113 or M2A2ODS-E, engineer Bradley fighting vehicle (EBFV), and an armored combat earthmover (ACE). If necessary, the engineer platoon may be reinforced with elements from the engineer company's A&O platoon.

b. **Assault and Obstacle Platoon**. The A&O platoon consists of two assault sections and an obstacle section. Each assault section has two armored-vehicle-launched bridges (AVLBs), two ACEs, and two mine-clearing line charges (MICLICs). The obstacle section has two M548s (which carry the Volcano mine-laying system), two small earth excavators (SEEs), two heavy expanded-mobility tactical trucks (HEMTTs), and one ACE.

8-12. MOBILITY

At the tactical level, overwatching mobility is critical to the success of the force. Engineers support infantry by performing obstacle reduction and route construction/improvement.

a. **Obstacle Reduction**. Reduction is the creation of lanes through or over an obstacle to allow an attacking force to pass. The number and width of lanes created varies with the factors of METT-TC. The lanes must allow the assault force to rapidly pass through the obstacle. The breach force will reduce, proof (if required), mark, and report lane locations and the lane marking method IAW unit SOP. Engineers cannot reduce an obstacle until the obstacle has been identified, effective suppression and obscuration are in place, and the point of breach is secure. (For detailed discussions of breaching see FM 3-34.2 and FM 71-1.)

b. **Route Construction and Improvement**. Engineers have a limited capability to construct, improve, and maintain roads, bridges, and fords. In addition to providing mobility support during offensive operations, engineers can enhance mobility during defensive operations by focusing on the ability to shift forces. Enhancements to mobility during defensive operations include:

- Mobility between primary, alternate and supplementary battle positions.
- Mobility of reserves to reinforcing positions.
- Mobility of reserves in the counterattack.

8-13. COUNTERMOBILITY

Engineers construct obstacles that prevent the enemy from successfully executing his scheme of maneuver. (For a detailed discussion of countermobility operations, see FM 71-1.) Commonly used obstacles include minefields, wire obstacles, antitank ditches, road craters, abatis, and log cribs. Engineers also can reinforce restrictive terrain and existing obstacles to disrupt, fix, turn, or block the enemy. Platoons will execute the company team commander's countermobility plan. Within this plan, the infantry rifle squads will typically assist engineers in the emplacement of obstacles. Regardless of the type of defense employed, the platoon leader must remember the five basic principles of obstacle employment.

- Obstacles must support the scheme of maneuver.
- Obstacles must be integrated with and covered by observed direct and indirect fires.
- Obstacles must tie into terrain and existing obstacles.
- Obstacles are most effect when complex and employed in depth.
- Obstacles should be employed to surprise the enemy.

8-14. SURVIVABILITY

The survivability plan will be synchronized with the company team countermobility plan. Platoons should prepare by marking vehicle positions, identifying leaders to supervise position construction, and designating guides for the blade movement between positions. Platoons will execute the company team commander's plan for priority of the survivability effort. This plan should specify the following:

- Level of survivability of each subordinate unit.
- Priority of survivability support by specific unit, type of weapon system, or combination.

- Type of position to be dug for a unit or type of weapon system.
- Sequence and time allocated for platoons to receive blade support.

Section III. AIR DEFENSE

Bradley Stinger fighting vehicle (BSFV), Linebacker, Avenger, or Stinger assets may support the BFV infantry platoon. Although the BFV platoon's role in air defense is limited to reporting threat aircraft, the platoon should practice passive and active air defense measures for protection against threat air attack.

8-15. ACTIVE AIR DEFENSE

The BFV platoon avoids engaging threat aircraft if possible. If engagement is unavoidable, the platoon uses a technique known as volume of fire (Figure 8-18). This technique is based on the premise that the more bullets a unit can put in the sky, the greater the chance the enemy will fly into them. Even if these fires do not hit the enemy, a "wall of lead" in the sky can intimidate enemy pilots, causing them to break off their attack, or can distract them from taking proper aim. One of the most important points about volume of fire is that, once the lead distance is estimated, the soldier must aim at the estimated aiming point and fire at that single point until the aircraft has flown past it. The soldier maintains the aiming point, not the lead distance. Once the soldier starts firing, he does not adjust his weapon. The platoon leader establishes the aiming point based on the type of aircraft that is attacking (Figure 8-19).

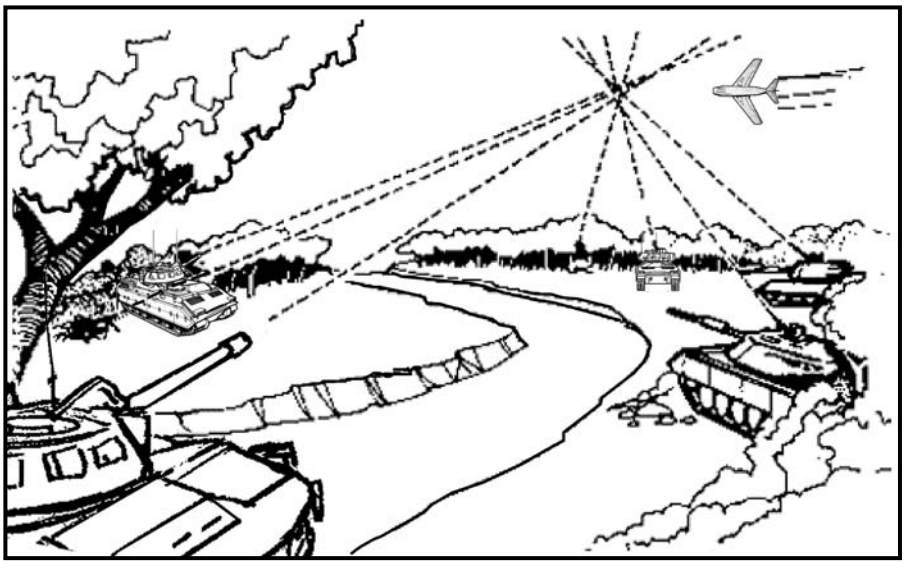
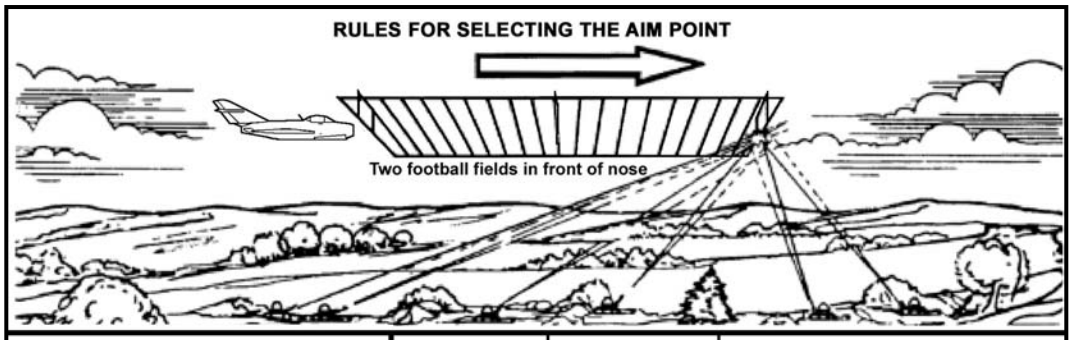
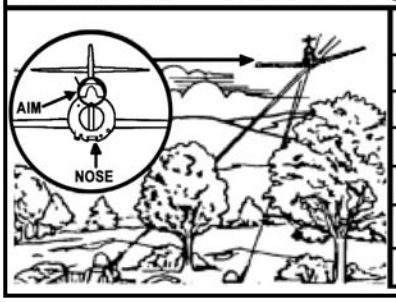


Figure 8-18. Volume of fire.





TYPE AIRCRAFT	COURSE	AIM POINT
JET	CROSSING	TWO FOOTBALL FIELDS IN FRONT OF NOSE
JET	OVERHEAD	TWO FOOTBALL FIELDS IN FRONT OF NOSE
JET	DIRECTLY AT YOU	SLIGHTLY ABOVE AIRCRAFT NOSE
HELICOPTER	CROSSING	ONE-HALF FOOTBALL FIELD IN FRONT OF NOSE
HELICOPTER	HOVERING	SLIGHTLY ABOVE HELICOPTER BODY
HELICOPTER	DIRECTLY AT YOU	SLIGHTLY ABOVE HELICOPTER BODY

Figure 8-19. Aim points.

a. **Weapon Control Status.** Weapon control statuses describe the relative degree of control of air defense fires. Weapon control statuses apply to weapon systems, volumes of airspace, or types of air platforms. The degree or extent of control varies depending on the tactical situation. Establishment of separate weapon control statuses for fixed- and rotary-wing aircraft, unmanned aerial vehicles (UAVs), and missiles is normal.

(1) ***Weapons Free.*** Weapons can fire at any air target not positively identified as friendly. This is the least restrictive weapon control status.

(2) ***Weapons Tight.*** Fire only at air targets positively identified as hostile according to the prevailing hostile criteria. Positive identification can be effected by a number of means to include visual identification (aided or unaided) and meeting other designated hostile criteria supported by track correlation.

(3) ***Weapons Hold.*** Do not fire except in self-defense or in response to a formal order. This is the most restrictive weapon control status. The BFV platoon should always be in WEAPONS HOLD.

b. **Short-Range Air Defense Systems.** Although other short-range air defense (SHORAD) systems support divisional units, BFV platoons with dedicated ADA systems are most likely to be supported by the M6 Bradley Linebacker (Figure 8-20, page 8-24) or a man-portable air defense system (MANPADS). Stinger MANPADS (Figure 8-21, page 8-25) is designed to counter high-performance, low-level, ground attack aircraft; helicopters; and observation and transport aircraft.

(1) The Linebacker's combined arms mission is to provide protection to mechanized combat forces, combat support elements, and other critical assets from attack by enemy rotary-wing aircraft, fixed-wing aircraft, UAVs, and cruise missiles (CMs). The Linebacker provides the task forces with highly mobile dedicated air defense firepower. The Linebacker is equipped with the standard vehicle-mounted launcher (SVML), which carries four Stinger missiles and has the following capabilities.

- The modified fire control subsystem fires, and the SVML, allows the Linebacker to shoot on the move.
- The four-man squad remains under armor protection.
- Targeting data is provided by the forward area air defense (FAAD) command, control, communications, and intelligence (C3I).
- The Linebacker system allows shoot-on-the-move and slew-to-cue capability.
- In the event of launcher system damage or failure or static mode, the system maintains dismounted Stinger missile capability.
- The 25-mm chain gun contributes adjunct air defense firepower and, as with the 240C, the 7.62-mm coax machine gun provides self-defense.

Figure 8-20. M6 Bradley Linebacker.

(2) The Stinger missile system employs a two-man crew (crew chief and gunner). The MANPADS team normally has a BFV as its assigned transportation. Unit leaders must carefully consider the consequences before separating a Stinger team from its vehicle. Stinger teams operating away from their vehicles have no more than two missiles available for resupply.

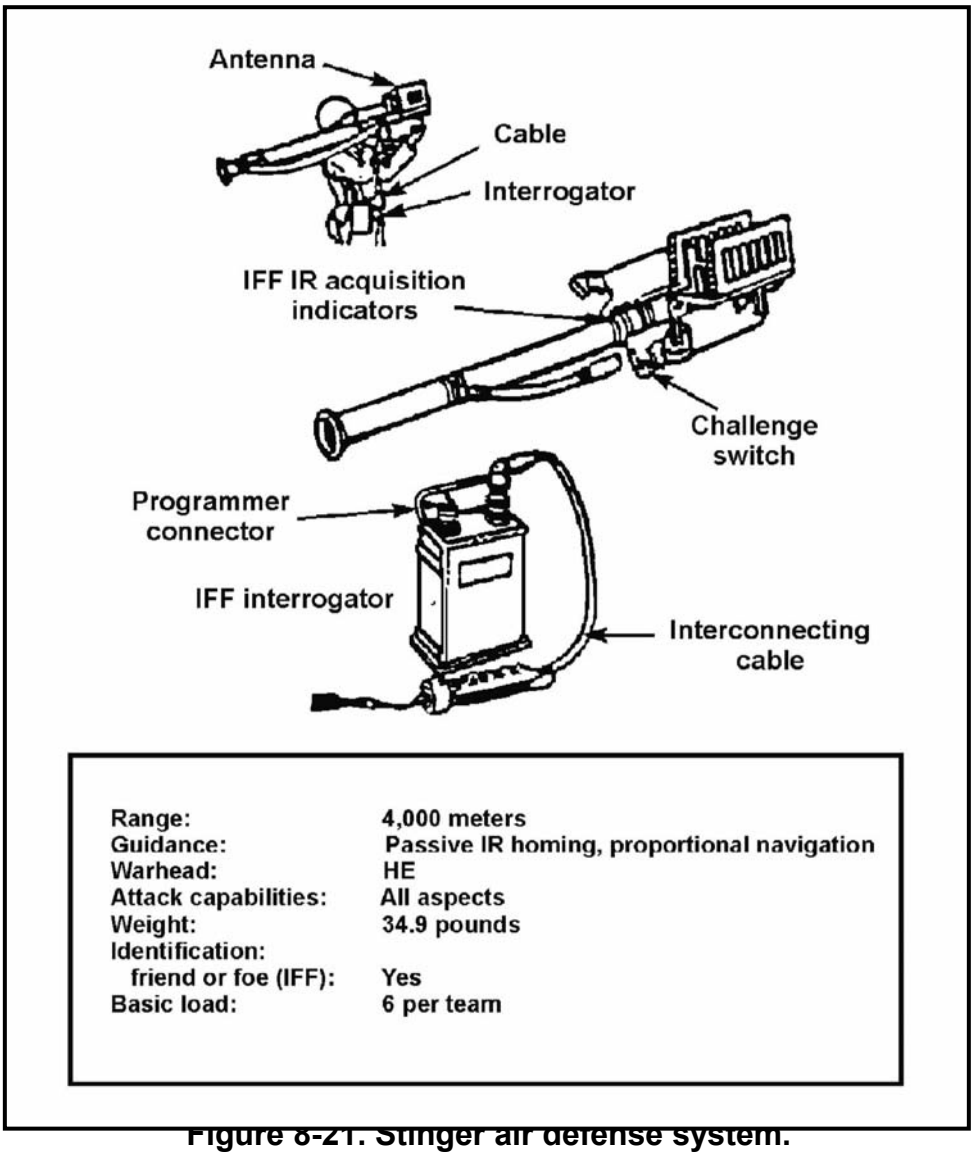


Figure 8-21. Stinger air defense system.

(3) If the brigade has an attached SHORAD battery, the BFV platoon will receive early warning alerts from the SHORAD battery and its elements. The SHORAD C3I Sentinel radar team can broadcast early warning of threat air activity to SHORAD elements (battery, platoon, or section), to FA fire units, and to air defense LNOs. The SHORAD battery will then provide voice early warning on the brigade command net. If METT-TC factors permit, the SHORAD platoon provides voice early warning to the task forces.

(4) The Sentinel radar (Figure 8-22, page 8-26) provides a 360-degree detection capability for various air tracks (rotary- and fixed-wing aircraft, UAVs, and cruise missiles) to a range of 40 kilometers. The Sentinel radar is normally OPCON to the respective SHORAD battery commander.

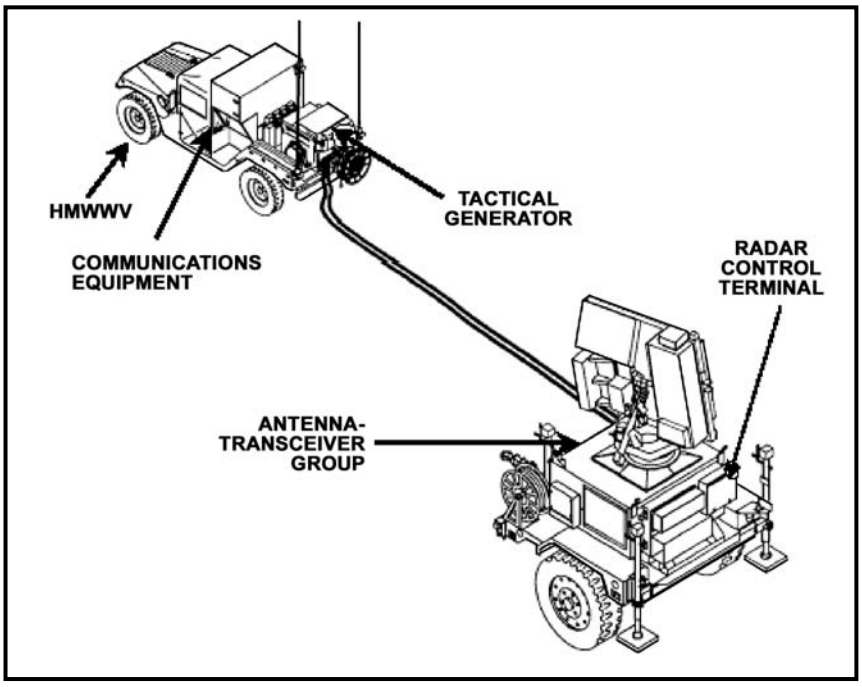


Figure 8-22. Sentinel radar system.

8-16. PASSIVE AIR DEFENSE

Passive air defense measures are all measures other than active defense taken to minimize the effects of the hostile air action. Passive defense measures are of two types: attack avoidance and damage-limiting. Both include the use of cover, concealment, camouflage, protective cover, and deception.

a. **Attack Avoidance Measures.** Attack avoidance means taking the actions necessary to avoid being seen by the threat. A threat pilot cannot attack what he cannot see. The techniques, procedures, and materials used for concealment from aerial observation are the same as those used for concealment from ground observation. The platoon should routinely practice and enforce hiding, blending, and disguising reflective equipment to avoid detection.

b. **Damage-Limiting Measures.** Damage-limiting measures are those taken to reduce the effects of a threat air attack. One of the best damage-limiting measures is the use of dispersion to lessen target density and reduce the lethal effects of the ordnance used against the platoon. When an attack is imminent, the platoon disperses, moves to concealed positions, and stops. These actions reduce the probability of being spotted and, if spotted, reduce the effects of threat munitions.

8-17. AIR DEFENSE WARNINGS

Air defense, passive or active, is more effective if the platoon knows beforehand that an air attack is imminent. The initial warning should come from the supporting ADA unit or higher headquarters. Air defense warnings come both from the OPORD and over radio command frequencies. RED indicates that an attack is imminent or in progress; YELLOW indicates that an attack is probable; and WHITE indicates that an attack is not likely.